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What is claimed is:

1. A photoresist composition, comprising

a resin binder, and

an encapsulated material comprising inorganic core particles at least partially coated with a moiety having a protected acidic group.

2. The photoresist of claim 1, wherein the protected acidic group comprises an acid-labile group.

3. The photoresist of claim 1, wherein the protected acidic group comprises a photo-labile group.

4. The photoresist of claim 3, wherein the encapsulated material is base soluble upon activation by actinic radiation.

5. The photoresist of claim 2, wherein the acid labile group can be any of acetal, ketal, ester, carbonate, and malonate,

6. The photoresist of claim 5, wherein the acid labile group can be any of t-butyl ester, t-butyl carbonate, and t-butyl malonate.

7. The photoresist of claim 3, wherein the photo-labile group can be any of an aliphatic diazoquinone or an aromatic diazoquinone moiety.

8. The photoresist of claim 7, wherein the photo-labile group comprises diazonaphthoquinone (DNQ).

9. The photoresist of claim 2, further comprising a PAG that generates acid upon activation by actinic radiation to remove said protective acide labile group to render the encapsulated material base soluble.

10. The photoresist of claim 1, wherein said protected acidic group can be any of a protected carboxylic, a protected phenol, or a protected hydroxyl group.

11. The photoresist of claim 1, wherein the core particles are formed of a metal oxide.

12. The photoresist of claim 11, wherein the metal oxide can be any of SiO_2, Al_2O_3 or TiO_2.

13. The photoresist of claim 12, wherein the core particles are formed of SiO_2 having silanol containing surfaces.

14. The photoresist of claim 13, wherein the moiety coating the core particles comprises a hydrocarbon chain attached at one end to the protected acidic group and at another end to the surface silanol.

15. The photoresist of claim 14, wherein the hydrocarbon chain comprises less than about 20 carbon atoms.

16. The photoresist of claim 1, wherein the core particles have an average size less than about 10 nanometers.

17. A method of processing a semiconductor substrate, comprising:

coating the substrate surface with a photoresist composition comprising a resin binder, and an encapsulated material comprising inorganic core particles at least partially coated with a moiety having a protected acidic group,

exposing selected portions of the coated surface to an activating radiation to cause a chemical transformation in the exposed portions,

removing either the radiation-exposed or unexposed portions of the photoresist composition, and

plasma-etching the substrate surface to generate a pattern thereon.

18. A method of processing a semiconductor substrate, comprising:

coating the substrate surface with a photosensitive resist comprising a resin binder, and an encapsulated material comprising inorganic core particles at least partially coated with a moiety having a protected acidic group,

exposing selected portions of the coated surface to an activating radiation to cause a chemical transformation in the exposed portions,

removing either the radiation-exposed or unexposed portions of the resist composition, and

exposing the substrate surface to an ion beam to implant a selected dose of the ion in the portions of the substrate from which the photoresist coating is removed.

19. A method of processing a semiconductor substrate, comprising:

coating the substrate surface with a multi-layer photoresist composition having at least one layer comprising a resin binder, and an encapsulated material comprising inorganic core particles at least partially coated with a moiety having a protected acidic group,

exposing selected portions of the coated surface to an activating radiation to cause a chemical transformation in the exposed portions,

removing either the radiation-exposed or unexposed portions of the photoresist composition, and

plasma-etching the substrate surface to generate a pattern thereon.